What is Claimed is:

1. A method of forming an optical fiber preform, the method comprising:: providing a consolidated glass preform precursor body having an outer surface; depositing a layer of silica soot onto the outer surface of the consolidated glass preform precursor body to form a composite preform comprised of a consolidated glass portion and a silica soot portion; and

in a deuterium-exposing step, exposing the composite preform to an atmosphere containing a concentration of a deuterium compound for a time and at a temperature sufficient to cause the deuterium compound to penetrate the consolidated glass portion without pervading the entire glass portion.

- 2. The method of Claim 1 wherein the depositing step further comprises causing a hydrogen compound to penetrate the consolidated glass preform precursor body.
- 3. The method of Claim 2 wherein at least a portion of the hydrogen compound in the consolidated glass preform precursor body is exchanged with at least a portion of the deuterium compound.
- 4. The method of Claim 1 further comprising, after the depositing step, exposing the composite preform to a chlorine-compound-containing atmosphere.
- 5. The method of Claim 4 wherein the chlorine-compound-containing atmosphere comprises an inert gas.
- 6. The method of Claim 4 wherein, the composite preform is exposed to a chlorine-compound-containing atmosphere prior to the deuterium-exposing step.
- 7. The method of Claim 4 wherein the composite preform is exposed to a purge atmosphere comprising an inert gas prior to the deuterium-exposing step.

- 8. The method of Claim 4 wherein the composite preform is exposed to a chlorinecompound-containing atmosphere, and then the composite preform is exposed to a purge atmosphere comprising an inert gas, prior to the deuterium-exposing step.
- 9. The method of Claim 4 wherein the composite preform is exposed to a purge atmosphere comprising an inert gas after the deuterium-exposing step.
- 10. The method of Claim 4 wherein the composite preform is exposed to a chlorine-compound-containing atmosphere after the deuterium-exposing step.
- 11. The method of Claim 4 wherein, after the deuterium-exposing step, the composite preform is exposed to a purge atmosphere comprising an inert gas, and then the composite preform is exposed to a chlorine-compound-containing atmosphere.
- 12. The method of Claim 1 further comprising consolidating the silica soot portion to form a second consolidated glass preform precursor body comprised of the glass portion and a second glass portion formed from the silica soot portion.
- 13. The method of Claim 12 further comprising repeating the depositing step and the deuterium-exposing step.
- 14. The method of Claim 13 further comprising heating and drawing the second consolidated glass preform precursor body to a reduced diameter prior to depositing silica soot thereon.
- 15. The method of Claim 1 wherein the deuterium compound penetrates the glass portion to a desired depth.
- 16. The method of Claim 1 wherein the consolidated glass preform precursor body is generally cylindrical about a centerline axis, wherein at least a portion of the consolidated glass preform precursor body has a radial thickness RC1 measured from the centerline axis, and wherein less than 0.1 ppm of any deuterium compound is present at radii less than about 0.25 RC1.

- 17. The method of Claim 1 wherein less than 0.1 ppm deuterium compound is formed by the reaction of deuterium with the consolidated glass portion at radii less than about one-fourth the radius of the consolidated glass preform precursor body.
- 18. The method of Claim 16 wherein less than 0.1 ppm of the deuterium compound is present at radii less than about 0.5 RC1.
- 19. The method of Claim 16 wherein less than 0.1 ppm of the deuterium compound is present at radii less than about 0.75 RC1.
- 20. An optical fiber preform made in accordance with the method of Claim 1.